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a pupil that the images on their retinas are formed by this opening rather than by the lens, which is thus in a measure functionless.

Most vertebrates are unable to accommodate their eyes so that they can see equally well in water and in air. Water animals when in the air are extremely shortsighted; air-inhabiting forms when in water are very farsighted. Only some few vertebrates, such as the pond turtles which seek their prey both by land and water, seem to see well on land and yet accommodate for near vision in water.

Those animals that accommodate by moving their lenses (cephalopods, fish, amphibia, and some snakes) presumably suffer no special loss of this power as age advances. Those whose accommodation depends upon a change in the form of the lens, brought about through its elasticity (most reptiles, birds, and mammals), probably suffer as the human being does, and become permanently farsighted as age advances.

G. H. P.

**The Sense of Hearing** is the subject of a popular discourse delivered by Dr. K. Vohsen<sup>1</sup> before the Senckenberg Natural History Society and published in their proceedings. The speaker calls attention to the relation between speech and hearing, and shows in a table the zoölogical distribution of sound-producing and sound-perceiving organs. While almost all animals possess the latter, only arthropods and vertebrates possess the former. The auditory vesicles of the invertebrates, as well as the inner ears of the vertebrates, are described. Only a hint is given that the so-called auditory organs of the lower animals may also be concerned with the function of equilibration, and no mention is made of the fact that, in the cases most carefully examined, equilibrations seem to be the exclusive function of these parts. The lecture contains an excellent table showing the range of hearing in the human ear, and the complex question of the analysis of sound by the ear is considered.

G. H. P.

**Physiology for Schools.**—In a little book of Laboratory Exercises<sup>2</sup> Mr. James Edward Peabody has done a good work, for which many teachers will be grateful. By series of skillfully framed questions upon objects readily accessible, the pupil is led to exert his

<sup>1</sup> Vohsen, K. Über den Gehörsinn, *Bericht d. Senckenberg. naturf. Gesell.*, 1898, pp. 91–112.

<sup>2</sup> Peabody, J. E., Instructor in Biology in the High School for Boys and Girls, New York City. *Laboratory Exercises in Anatomy and Physiology*. New York, Henry Holt & Co., 1898. Cloth, x + 78 pp., interleaved.

powers in making simple yet significant observations, experiments, and inferences which cannot fail to awaken a lively interest. Certain of these exercises are intended to be performed by the pupil at home and reported on in class. Others involve a demonstration by the teacher before the class. Not the least valuable feature is a series of questions to be used in making a "Comparative Study of the Mammalian Skeleton," as shown in such a collection as that of the American Museum of Natural History. This points the way to a wider educational use of museums in large cities. The book is full of helpful suggestions.

The only passages noticed as calling for amendment are the following: On p. 62 the pupil is directed to "prepare a strong solution of quinine in water by dissolving sulphate of quinine in water by the aid of sulphuric acid." This is hardly explicit enough for home use. Moreover, sulphuric acid in inexperienced hands seems unsafe. In the directions for applying "the nitric acid and ammonia test" (p. 22) the boiling necessary to secure the xantho-proteic reaction is not mentioned.

FREDERICK LEROY SARGENT.

**Overton's Physiology.**<sup>1</sup> — It is not often that we find so much nonsense compressed into a small volume as a casual glance reveals in this one. A few extracts will show the character of the whole volume. "In moist earth there lives a little animal called the *ameba*." "All animals must have water to drink." "*Oil*, or *fat*, is found in little pockets between the cells." "The fat around the cells is like a cushion, which protects the cells and keeps them warm." Starch grains "dissolve in water and form a paste." "When the plant ripens, the starch changes to sugar." "Most of the fat is oxidized in the lungs." The mind "tells the liver cells to change the digested food to blood." "The mind lives in a few cells and rules all the rest." "From the cells [of bone] there go out fine strings of connective tissue. Lime is mixed among the strings like starch among the fibers of a linen collar." Between the vertebræ "are thick, strong pads of tough flesh or gristle." The scapula "is not joined to any bone." "A muscle is large at one end and is fast to a bone." "The power of a muscle comes from the heat of oxidized food." "Cell, the smallest part of the body which can live when separated from the rest." "The only cells of the body which can move about are the white blood cells. The rest are held in place by strings of

<sup>1</sup> Overton, Frank, A.M., M.D. *Applied Physiology, including the Effects of Alcohol and Narcotics*. New York, American Book Company, 1898.